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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,609	09/30/2003	Haruaki Watanabe		2559

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MATTINGLY, STANGER & MALUR, P.C.
Suite 370
1800 Diagonal Road
Alexandria, VA 22314

EXAMINER

BLACK, LINH

ART UNIT	PAPER NUMBER
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2169

MAIL DATE	DELIVERY MODE
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12/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/673,609

Applicant(s)

WATANABE ET AL.

Examiner

LINH BLACK

Art Unit

2169

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11, 12, 14-17, 19-22 and 24-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11, 12, 14-17, 19-22 and 24-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This communication is responsive to the Applicants' Amendment dated 9/17/08. Claims 11-12, 14-17, 19-22, 24-30 are pending in the application. Claims 11, 16, 21, 24, and 27 are independent claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-12, 14-17, 19-22, 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Milligan et al. (US 5210866), and further in view of Bachmat et al. (6237063).

As per claims 11, 16, Milligan et al. teach data recovering in case of processing failure – col. 3, line 13 to col. 4, line 46.

a host computer and a storage system storing data accessed by said host computer – col. 5, lines 30-34; fig. 1 (host processors 11, 12, connect to control unit which interconnect to control circuits 121).

wherein said storage system includes a first physical storage area in one or more disks in said storage system and a controller for accessing the one or more disks in said storage system – fig. 1, items 103-125 (disk drive manager and disk drive subsets); col. 3, lines 13-49.

wherein said first physical storage area corresponds to a first logical volume accessed by said host computer; wherein said host computer stores data in said first physical storage area, and a backup copy of the data is stored to a tape at a certain point in time – col. 1, line 61 to col. 2, line 32; col. 3, lines 50 to col. 4, line 25 (in time of a physical disk drive failed, a backup disk drive from the shared pool of spare disk drives is automatically switched in place of the failed disk drive); fig. 1; col. 8, line 40 to col. 9, line 20; col. 11, line 65 to col. 12, line 2 (The redundancy group is also called a logical volume or logical device. Within each logical device there are a plurality of logical tracks, each of which is the set of all physical tracks in the redundancy group which have the same physical track address); col. 21, line 11 col. 22, line 32; col. 25, lines 15-55 (backup copy/snapshot copy – at certain point in time - used for disk backup purposes or write these modified virtual tracks to a tape drive...)

wherein after said certain point in time, upon occurrence of a failure in a sequence of processing executed by said host computer, said host computer selects an unused second logical volume in said storage system, said second logical volume corresponding to a second physical storage area in said one or more disk, and reads the backup copy of the data made at the certain point in time from the tape and

write...to said second logical volume – col. 1, line 65 to col. 2, line 30; col. 3, lines 50-60; col. 5, line 63 to col. 5, line 3; col. 6, lines 43-61.

wherein said host instructs said controller to relate said second logical volume in said second physical storage area to said first logical volume in said first physical storage area according to a swap request by exchanging positional information of the first logical volume with that of the second logical volume, so that said controller accesses said second physical storage area when said controller receives an access request to said first logical volume from said host computer – col. 3, last par.; col. 5, line 63 to col. 6, line 3 (swap/switch a backup disk drive to a the failed disk drive is automatically done in which it is done by switching/exchanging the positional/address information of each other); col. 7, lines 29-66.

However, Milligan et al. do not explicitly disclose data of said first logical volume is interchanged with data in the second logical volume; sets a value of a device busy request...to indicate busy when said storage system receives said swap request from said host computer. Bachmat et al. further the teaching of the swap/switch to a spare/unused logical volume to backup data in case of a failure in a sequence of processing executed by said host computer by teaching physical disk storages and mirrored logical volumes – col. 3, lines 29-45; col. 4, lines 19-40; swapping logical volumes on the same physical disk storage device – col. 6, lines 29-67; col. 8, lines 11-31; select first and second logical volumes on different disk storage devices to be exchanged, once the selection is made, the data in the first and second logical volumes

are exchanged – col. 3, lines 29-45; sets a value of a device busy request...to indicate busy when said storage system receives said swap request from said host computer – col. 12, lines 5-18 (physical drives have been analyzed in which physical disk drives are ordered by their respective time-based utilization statistics...an exchangeable pair of logical volumes is selected...one of the pair is the busiest logical volume...and the second is the least busy logical volume...improved load balancing will be achieved). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Bachmat et al.'s teaching in order to allow the swapping/switching/exchanging logical volumes to better in load balancing as of Bachmat et al.'s teaching or in provide a spared disk drive will be switched to usage when there is a disk failure as of Milligan et al.'s teaching.

As per claims 12, 17, Milligan et al. teach:

wherein before receiving said swap request, said controller relates an ID of said first logical volume to an ID of said first physical storage area and accesses said first physical storage area according to an access request including said ID of said first logical volume received from said host computer; wherein after receiving said swap request, said controller relates an ID of said first logical volume to an ID of said second physical storage area, and accesses said second physical storage area according to an access request including said ID of said first logical volume received from said host computer – col. 3, line 50 to col. 4, line 46; col. 7, line 30 to col. 8, line 39.

As per claims 14, 19, Milligan et al. teach:

wherein said storage system includes plural first physical storage areas, each of which corresponds to a first logical storage area in said first logical volume, and plural second physical storage areas, each of which corresponds to one of said plural first physical storage areas – fig. 6, item 605; col. 3, line 12 to col. 4, line 46; col. 11, line 47 to col. 12, line 46.

wherein said controller stores the backup copy of the data in said plural second physical storage areas, said backup copy of the data stored in the second physical storage area being the data stored in the first physical storage area corresponding to said second physical storage area at the certain point in time – col. 5, line 30 to col. 6, line 3; col. 21, line 11 to col. 22, line 32.

according to said swap request, said controller relates one of said plural second physical storage areas to a first logical storage area which corresponds to a first physical storage area corresponding to said one of said plural second physical storage areas, so that said controller accesses said one of said plural second physical storage areas when said controller receives an access request to said first logical storage area - col. 7, lines 29-66; col. 3, line 50 to col. 4, line 46.

As per claims 15, 20, Milligan et al. teach:

wherein before receiving said swap request, said controller relates an ID of said first logical volume to IDs of first logical storage areas and IDS of said plural first physical storage areas and accesses one of said plural first

physical storage areas according to an access request including said ID of said first logical volume and an ID of a first logical storage area - col. 3, lines 13-49.

wherein after receiving said swap request, said controller relates said ID of said first logical volume to said IDS of said first logical storage areas, an ID of at least one of said plural first physical storage areas, and an ID of said one of said plural second physical storage areas, and accesses said one of said plural second physical storage areas according to an access request including said ID of said first logical volume and an ID of a first logical storage area corresponding to said ID of said one of said plural second physical storage areas – col. 3, line 50 to col. 4, line 46; col. 7, line 30 to col. 8, line 39.

As per claims 21, 24, Milligan et al. teach:

at least one disk; a first physical storage area in said at least one disk, said first physical storage area being included in a first logical volume accessed by said host computer, a second physical storage area included in a second logical volume in said at least one disk – col. 2, lines 55-58; col. 3, line 13 to col. 4, line 46; col. 11, line 65 to col. 12, line 2 (The redundancy group is also called a logical volume or logical device. Within each logical device there are a plurality of logical tracks (these tracks should be continuous), each of which is the set of all physical tracks in the redundancy group which have the same physical track address); col. 21, lines 11-65.

a controller coupled to said at least one disk; wherein a backup data is stored to a tape, said backup copy of data being a copy of data stored in said first physical storage area

at a certain point in time; wherein said controller accesses said first physical storage area according to an access request to said first logical volume received from said host computer - col. 1, line 61 to col. 2, line 32; col. 3, lines 13 to col. 4, line 47; col. 21, line 11 col. 22, line 32.

wherein when recovery of the data in the first logical volume to the certain point in time becomes necessary, said host computer selects the second logical volume in said storage system, and reads the backup copy of the data made at certain point in time from the tape to said second logical volume - col. 1, line 65 to col. 2, line 9; col. 3, lines 57-60; col. 5, line 63 to col. 5, line 3; col. 6, lines 43-61.

wherein after said controller receives a swap request from said host computer, said controller accesses said second physical storage area according to an access request to said logical volume received from said host computer by exchanging positional information between said first physical storage area and said second storage area with each other - col. 5, line 63 to col. 6, line 3 (swap/switch a backup disk drive to a the failed disk drive is automatically done in which it is done by switching/exchanging the positional/address information of each other); col. 7, lines 29-66. However, Milligan et al. do not explicitly disclose data of said first logical volume is interchanged with data in the second logical volume; sets a value of a device busy request...to indicate busy when said storage system receives said swap request from said host computer.

Bachmat et al. further the teaching of the swap/switch to a spare/unused logical volume to backup data in case of a failure in a sequence of processing executed by said host computer by teaching physical disk storages and mirrored logical volumes – col. 3, lines 29-45; col. 4, lines 19-40; swapping logical volumes on the same physical disk storage device – col. 6, lines 29-67; col. 8, lines 11-31; sets a value of a device busy request...to indicate busy when said storage system receives said swap request from said host computer – col. 12, lines 5-18 (physical drives have been analyzed in which physical disk drives are ordered by their respective time-based utilization statistics...an exchangeable pair of logical volumes is selected...one of the pair is the busiest logical volume...and the second is the least busy logical volume...improved load balancing will be achieved). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Bachmat et al.'s teaching in order to allow the swapping/switching/exchanging logical volumes to better in load balancing as of Bachmat et al.'s teaching or in provide a spared disk drive will be switched to usage when there is a disk failure as of Milligan et al.'s teaching.

As per claims 22, 25, Milligan et al. teach:

wherein said controller relates an ID of said first logical volume to an ID of said second physical storage area according to said swap request, so that said controller accesses said second physical storage area when said controller receives an access request including said ID of said first logical volume after receiving said swap request - col. 3, lines 13-49.

As per claim 26, Milligan et al. teach: wherein said backup data is stored from a tape medium to said second physical storage area – fig. 1; col. 8, line 40 to col. 9, line 20.

Claims 27-30 claim the same subject matter as of previous claims and are rejected based on the same prior art. However, Milligan et al. disclose mapping of first logical areas of said first logical volume to said first physical storage areas, and second logical areas of said second logical volume to said second physical storage areas – the abstract; fig. 1; col. 1, line 63 to col. 2, line 34; col. 3, line 13 to col. 4, line 25; swapping of positional information of logical drives in case of failure - – col. 5, line 63 to col. 6, line 3 (swap/switch a backup disk drive to a the failed disk drive is automatically done in which it is done by switching/exchanging the positional/address information of each other); col. 7, lines 29-66.

However, Bachmat et al. further the teaching of the swap/switch to a spare/unused logical volume to backup data in case of a failure in a sequence of processing executed by said host computer by teaching physical disk storages and mirrored logical volumes – col. 3, lines 29-45; col. 4, lines 19-40; swapping logical volumes on the same physical disk storage device – col. 6, lines 29-67; col. 8, lines 11-31; the least busy logical volume on the physical disk drive...- col. 12, lines 5-18.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LINH BLACK whose telephone number is 571-272-4106. The examiner can normally be reached on Mon.-Thurs..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Trujillo can be reached on 571-272-3677. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LINH BLACK
Examiner
Art Unit 2169

December 8, 2008

/HUNG Q. PHAM/
Primary Examiner, Art Unit 2169